

## **Appendix C**

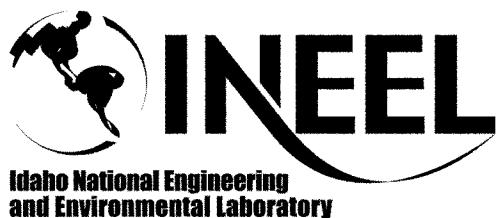
### **Air Emissions Calculations**



# Engineering Design File

## Exposure and Dose Calculations for Excavation of Mercury- and Radionuclide-Contaminated Soils at the CFA-04 Mercury Disposal Pond

[The following statement is optional:  
Prepared for:  
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Exposure and Dose Calculations for Excavation of Mercury- and Radionuclide-Contaminated				
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The SCREEN3 code and CAP-88 mainframe code were used to estimate exposures from mercury and doses from radionuclides, respectively, resulting from planned excavation and removal of contaminated soil from the CFA-04 pond site on the Idaho National Engineering and Environmental Laboratory. It was estimated that the calculated mercury exposures and radiological doses from the cleanup activity would be below levels of concern from both regulatory and health effect standpoints.				
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Author		Chris Staley		1/30/03
Independent Peer Reviewer	A	Paul Ritter		1/30/03
Doc. Owner	A	Deborah Wagoner		1/30/03
Requestor	Ac	John Giles		1/30/03
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# **Exposure and Dose Calculations for Excavation of Mercury- and Radionuclide-Contaminated Soils at the CFA-04 Mercury Disposal Pond**

## **1. SUMMARY**

The SCREEN3 code and CAP-88 mainframe code were used to estimate exposures from mercury and doses from radionuclides, respectively, resulting from planned excavation and removal of contaminated soil from the Central Facilities Area (CFA) -04 pond site on the Idaho National Engineering and Environmental Laboratory (INEEL). The CFA-04 is the site of the CFA-674 pond, which was used for disposal of mercury and low-level radioactively contaminated liquid waste. This waste was generated from calcine development work between 1953 and 1965 (Sage Earth Sciences 1995). Calculated mercury exposures and radiological doses from the cleanup activity would be below levels of concern from both regulatory and health effect standpoints.

## **2. METHODS/ASSUMPTIONS**

### **2.1 Source Term**

The remedial action being addressed in this analysis is the excavation and removal of mercury- and radionuclide-contaminated soil from the CFA-04 (dry) pond. Mercury and radionuclide concentrations in soil at CFA-04 have been measured at various locations and depths; the most recent sampling data are used for developing the source term for airborne releases. For sampling and excavation purposes, the pond is divided into 15 areas (Figure 1). Areas 1, 3, 4, 9, 10, and 15 are not contaminated to a level warranting remediation and, therefore, are not considered further. The key assumption in estimating soil contamination levels for air emissions calculations is: mercury and radionuclide contamination is uniformly distributed throughout the soil to be excavated at the maximum value measured in composited samples from each depth zone. For Areas 11, 12, 13, and 14, maximum radionuclide concentrations measured previously in the pond were used.

Initial soil concentration data are summarized in Table 1. Soil volumes to be excavated and mercury and radionuclide concentrations used in this analysis are summarized in Table 2.

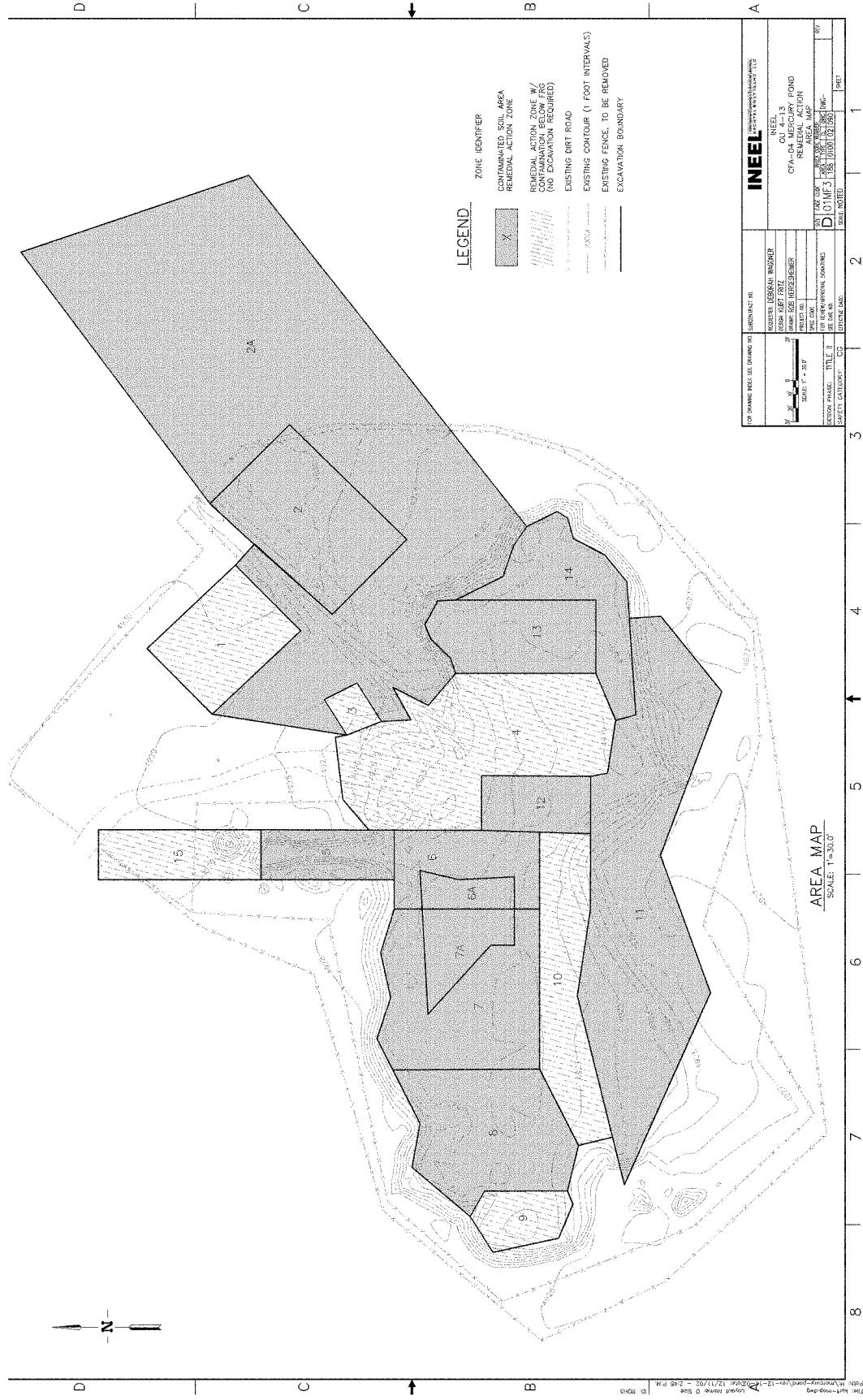


Table 1. Soil data used for determining soil concentrations

Area	Depth (ft)	Hg Conc. (mg/kg)	Radionuclide Concentration (pCi/g) <sup>a</sup>				
			Cs-137	Sr-90	U-234	U-235	U-238
2	0–1	8.8	–	–	0.9	0.068	1.05
2A							
5	0–1	63	0.374	–	4.3	0.581	5.94
	0–1	57.3	0.245	–	2.2	0.176	3.16
	1–2	75.8	–	–	1.16	0.119	1.41
6	2–3	82.8	–	–	9.72	1.13	13.8
	3–4	54.7	–	–	1.09	0.13	1.35
	4–5	42.7	–	–	1.25	0.12	1.33
	5–6	47	–	–	1.03	0.0991	1.11
	0–1	85.3	0.501	–	4.77	0.439	8.8
	1–2	45.5	0.0962	–	11.3	1.21	18.9
7	2–3	68.4	–	–	13.3	1.22	21.8
	3–4	118	–	–	1.51	0.148	2.15
	4–5	44.2	–	–	0.911	0.0914	1.15
	0–1	90.3	0.101	–	9.22	0.911	16.8
8	1–2	60.6	–	–	4.88	0.546	8.88
	2–3	60.6	–	0.453	8.79	0.73	15.4
	3–4	126	–	0.363	10.9	10.7	21.9
	0–1	5.2	1.45	–	2.45	0.43	2.98
11	1–2	15					
	2–3	19.2					
12	0–1	9.2	1.45	–	2.45	0.43	2.98
	1–2	13.3					
13	0–1	34.4	1.45	–	2.45	0.43	2.98
	1–2	10.4					
	0–1	41.4	1.45	–	2.45	0.43	2.98
	1–2	40					
14	2–3	5.1					
	3–4	2.7					
	4–5	12.1					

a. Blanks indicate radionuclide concentrations were below detection limits.

Table 2. The CFA-04 soil volumes to be excavated and contaminant concentrations in soil used for air emissions analysis.

Area	Soil Volume (m <sup>3</sup> )	Mercury Concentration in Soil (ppm)	Radionuclide Concentration in Soil (pCi/g)				
			Cs-137	Sr-90	U-234	U-235	U-238
2	134	9	—	—	0.9	0.068	1.05
2A	894						
5	107	63	0.374	—	4.3	0.581	5.94
6	844	83	0.245	—	9.72	1.13	13.8
7	1,516	118	0.501	—	13.3	1.22	21.8
8	1,142	126	0.101	0.453	10.9	10.7	21.9
11	2,045	19	1.45	—	2.45	0.43	2.98
12	184	13	1.45	—	2.45	0.43	2.98
13	348	34	1.45	—	2.45	0.43	2.98
14	892	41	1.45	—	2.45	0.43	2.98

Potential sources of airborne mercury and radionuclide emissions are contaminated fugitive dust from the excavation and handling of contaminated soil. Fugitive emissions (dust) will be controlled by keeping soil moist to the extent possible. Contaminated soil particles are re-suspended during excavation and handling at an assumed release fraction comparable to sand and gravel processing operations. This fraction, for “active storage piles,” is 0.21 kg/Mg or 0.00021 (U.S. Environmental Protection Agency [EPA] 1995a). The fraction is further reduced by 80% due to planned wetting (EPA 1995a), for a final release fraction of  $(0.00021 \times 0.2) = 0.000042$ . The assumed soil density is 1.5 g/cm<sup>3</sup>. Estimated releases are summarized in Table 3.

Table 3. Calculated emissions used for air and dose modeling

Area	Mercury Emissions (g/s)	Radionuclide Emissions (total Ci)				
		Cs-137	Sr-90	U-234	U-235	U-238
2	5.8E-06	—	—	7.6E-09	5.7E-10	8.9E-09
2A	5.8E-06	—	—	5.1E-08	3.8E-09	5.9E-08
5	4.2E-05	2.5E-09	—	2.9E-08	3.9E-09	4.0E-08
6	5.5E-05	1.3E-08	—	5.2E-07	6.0E-08	7.3E-07
7	7.8E-05	4.8E-08	—	1.3E-06	1.2E-07	2.1E-06
8	8.3E-05	7.3E-09	3.3E-08	7.8E-07	7.7E-07	1.6E-06
11	1.3E-05	1.9E-07	—	3.2E-07	5.5E-08	3.8E-07
12	8.8E-06	1.7E-08	—	2.8E-08	5.0E-09	3.5E-08
13	2.3E-05	3.2E-08	—	5.4E-08	9.4E-09	6.5E-08
14	2.7E-05	8.2E-08	—	1.4E-07	2.4E-08	1.7E-07
	SUM	3.9E-07	3.0E-08	3.2E-06	1.0E-06	5.1E-06

### 3. CONCENTRATION AND DOSE MODELING

The SCREEN3 code (EPA 1995b) was used to model air concentrations of mercury at various distances from the soil areas. Because of the way SCREEN3 handles area sources, each of the nine areas was modeled separately. Concentrations were modeled to three receptors: (1) the maximum on-INEEL receptor, which could be either inside the CFA-04 fence or not; (2) the maximum location at or beyond the fence line of CFA-04; and (3) the nearest “ambient air” (i.e., potential member of the public) receptor, 1,850 m from CFA, on U.S. Highway 20. The SCREEN3 output files are attached as Appendix B.

Radionuclide releases were modeled with the CAP-88 code (EPA 1990). The EPA has approved CAP-88 for modeling radionuclide emissions to demonstrate compliance with the National Emissions Standards for Hazardous Air Pollutants. Because radiological dose is calculated on an annual basis (mrem/yr), only the total release of each radionuclide is needed. The dose is calculated to a hypothetical maximally exposed individual member of the public living on the INEEL boundary. The location is determined by modeling to the nearest boundary location within each of 16 wind direction sectors, and for CFA, is 9,600 m SSW of CFA. Ten-year average meteorology from the CFA meteorological tower was used for the modeling. The CAP-88 output file attached as Appendix C is for a one-curie release of each radionuclide. Doses are scaled by actual releases.

### 4. RESULTS

Results of SCREEN3 modeling of mercury emissions are shown in Table 4. Eight-hour average concentrations are all below the American Conference of Governmental Industrial Hygienists (ACGIH) 8-hour average threshold limit value of 0.025 (2.5E-02) mg/m<sup>3</sup> (ACGIH 1999). Twenty-four hour average concentrations are all well below the most restrictive public receptor Acceptable Ambient Concentration for mercury or mercury compounds, 0.0005 (5E-04) mg/m<sup>3</sup>.

The dose to the maximally exposed individual from radionuclide releases, calculated by CAP-88, is 2.6E-05 mrem. This dose can be compared with the calendar year 2001 dose from all INEEL activities of 3.5E-02 mrem and to the standard for U.S. Department of Energy facilities of 10 mrem/yr.

Table 4. Results of SCREEN3 modeling of mercury emissions from CFA-04 remediation.

Area	8-Hour Average Concentration at Maximum Onsite Receptor (mg/m <sup>3</sup> )	8-Hour Average Concentration at CFA-04 Fence Line (mg/m <sup>3</sup> )	24-Hour Average Concentration at Nearest Ambient Location (mg/m <sup>3</sup> )
2	1.6E-04	1.6E-04	8.9E-08
2A	7.9E-05	NA <sup>a</sup>	5.8E-07
5	2.2E-03	2.1E-03	5.1E-07
6	5.7E-03	1.8E-03	5.3E-06
7	3.9E-03	2.4E-03	8.0E-06
8	5.3E-03	2.9E-03	8.6E-06
11	5.0E-04	4.8E-04	1.3E-06
12	8.9E-04	1.8E-04	1.9E-07
13	2.5E-03	8.1E-04	9.1E-07
14	2.1E-03	2.1E-03	2.8E-06

a. Area 2A extends beyond CFA-04 fence line, and SCREEN3 can only model outside the boundaries of the area being modeled. Therefore, no fence line concentration is calculated.

## 5. REFERENCES

- ACGIH, 1999, *Threshold Limit Values Booklet*, American Conference of Governmental Industrial Hygienists, 1999 edition.
- DOE-ID, 2000, *Comprehensive Remedial Investigation/Feasibility Study for the Central Facilities Area Operable Unit 4-13 at the Idaho National Engineering and Environmental Laboratory*, DOE/ID-10680, Rev. 1, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, July 2000.
- EPA, 1990, *The Clean Air Act Assessment Package - 1988 (CAP-88), A Dose and Risk Assessment Methodology for Radionuclide Emissions to Air*, Volumes 1-3, prepared by D. A. Beres, SC&A, Inc., for the U.S. Environmental Protection Agency.
- EPA, 1995a, *Sand and Gravel Processing, Final Report*, Section 11.19.1 in *Emission Factor Documentation for AP-42*, U.S. Environmental Protection Agency Office of Air Quality Planning and Standards, Emission Factor and Inventory Group, April 1995.
- EPA, 1995b, *SCREEN3 Model User's Guide*; EPA-454/B-95-004, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards: Research Triangle Park.
- Sage Earth Sciences, 1995, *Final Report – Geophysical Characterization WAG 4 CFA-674 Pond Area (CFA-04)*.

**APPENDIX A**

**SPREADSHEETS FOR RELEASE CALCULATIONS**

A<sup>2</sup>

Table A-1. CFA-04 pond areas to be excavated, approximate soil volumes, and contamination levels.

Area Designation	Area (ft <sup>2</sup> )	Assumed Contaminant Depth (ft)	Soil Volume (ft <sup>3</sup> )	Soil Volume (yd <sup>3</sup> )	Mercury (ppm)	Maximum Assumed Contaminant Concentrations (pCi/g)						
						Cs-137	Pa-234m	Sr-90	Th-234	U-234	U-235	U-238
2	9,471	0.5	4,736	175	9	1.45	NA	NA	NA	2.45	0.43	2.98
2A	63,130	0.5	31,565	1,169	9	1.45	NA	NA	NA	2.45	0.43	2.98
5	3,776	1	3,776	140	63	2	9	4.1	7	22.6	1.6	35
6	6,017	6	29,783	1,103	83	1.45	NA	NA	NA	2.45	0.43	2.98
7	13,072	5	53,491	1,981	118	1.45	NA	NA	NA	2.45	0.43	2.98
8	10,074	4	40,296	1,492	126	1.45	NA	NA	NA	2.45	0.43	2.98
11	24,061	3	72,183	2,673	19	—	—	—	—	—	—	—
12	3,247	2	6,494	241	13	1.45	NA	NA	NA	2.45	0.43	2.98
13	6,137	2	12,274	455	34	1.45	NA	NA	NA	2.45	0.43	2.98
14	6,300	5	31,500	1,167	41	—	—	—	—	—	—	—

Table A-2. Airborne mercury release spreadsheet.

Area	Soil Volume (yd <sup>3</sup> )	Soil Area (m <sup>2</sup> )	Volume excavated (m <sup>3</sup> )	Approximate Dimensions (m <sup>2</sup> )	Hours to Excavate <sup>a</sup>	Distance to Closest CFA-04 Fence	Mercury Concentration in Soil (mg/kg) <sup>b</sup>	Total g Hg in Soil Volume <sup>c</sup>	g/s Hg Emissions <sup>d</sup>	SCREEN3-C			8-Hour Average Concentration at Maximum Onsite Receptor <sup>e</sup> (mg/m <sup>3</sup> )	Calculated 1-Hour Concentration at CFA-04 Fence Line (mg/m <sup>3</sup> )	Calculated 1-Hour Concentration at CFA-04 Fence Line (mg/m <sup>3</sup> )	SCREEN3-C	8-Hour Average Concentration at Maximum Onsite Receptor <sup>e</sup> (mg/m <sup>3</sup> )	Calculated 1-Hour Concentration at CFA-04 Fence Line (mg/m <sup>3</sup> )	
										SCREEN3-Calculated 1-Hour Max. Conc. (mg/m <sup>3</sup> )	SCREEN3-Calculated 1-Hour Max. Conc. (mg/m <sup>3</sup> )	24-Hour Average Concentration at Nearest Ambient Location <sup>f</sup> (mg/m <sup>3</sup> )							
2	175	134	880	24 × 36.5 m	21 m	3.5	9	1.77E+03	5.83E-06	5.3E-04	1.6E-04	5.2E-04	1.6E-04	1.5E-06	8.9E-08	NA	NA	5.8E-07	
2A	1,169	894	5,865	115 × 51 m	NA	23.6	9	1.18E+04	5.83E-06	1.1E-04	7.9E-05	NA	NA	1.5E-06	NA	NA	NA	5.1E-07	
5	140	107	351	30 × 11 m	26 m	2.8	63	1.01E+04	4.17E-05	8.9E-03	2.2E-03	8.6E-03	2.1E-03	2.1E-03	1.1E-05	5.1E-07	NA	NA	NA
6	1,103	844	559	31 × 16 m	42 m	22.3	83	1.05E+05	5.49E-05	8.1E-03	5.7E-03	2.6E-03	1.8E-03	1.8E-03	1.4E-05	5.3E-06	NA	NA	NA
7	1,981	1,516	1,214	36 × 31.6 m	31 m	40.0	118	2.68E+05	7.82E-05	5.6E-03	3.9E-03	3.5E-03	2.4E-03	2.0E-03	2.0E-05	8.0E-06	NA	NA	NA
8	1,492	1,142	936	27 × 31.7 m	30 m	30.2	126	2.16E+05	8.35E-05	7.6E-03	5.3E-03	4.2E-03	2.9E-03	2.2E-03	2.2E-05	8.6E-06	NA	NA	NA
11	2,673	2,045	2,235	87.3 × 21 m	35 m	54.0	19	5.89E+04	1.27E-05	7.1E-04	5.0E-04	6.8E-04	4.8E-04	4.8E-04	3.3E-06	1.3E-06	NA	NA	NA
12	241	184	302	11.6 × 24 m	54 m	4.9	13	3.67E+03	8.81E-06	2.1E-03	8.9E-04	4.3E-04	1.8E-04	4.3E-04	2.3E-06	1.9E-07	NA	NA	NA
13	455	348	570	15.2 × 30 m	41 m	9.2	34	1.79E+04	2.28E-05	3.6E-03	2.5E-03	1.2E-03	8.1E-04	8.1E-04	5.9E-06	9.1E-07	NA	NA	NA
14	1,167	892	585	40 × 17.8 m	22 m	23.6	41	5.54E+04	2.74E-05	3.1E-03	2.1E-03	3.1E-03	2.1E-03	2.1E-03	7.1E-06	2.8E-06	NA	NA	NA

a. Based on excavation rate of 495 yd<sup>3</sup> (378 m<sup>3</sup>) per 10-hr day.

b. Mercury concentrations are maximum values from composited samples collected at various depths in each area.

c. Assumes uniform distribution of Hg in soil volume at stated concentration, 1.5-g/cc soil density.

Total g Hg = (mg/kg Hg) × (1 kg/1E06 mg) × (m<sup>3</sup> soil) × (1E06 cc/m<sup>3</sup>) × (1.5 g/cc soil density)

d. Assumes 2.1E-04 re-suspension rate and 80% reduction for watering (0.00021 × .2 = 0.000042) (AP-42).

g/s Hg emission = [(total g Hg) × (0.00042)] / [(hours to excavate) × (3,600 sec/hr)]

e. Location varies from 21–54 m from center point of each area.

8-hour average concentration = (SCREEN3 1-hour concentration) × (0.7 persistence factor) × [hours to excavate if less than 8) / (8 hours averaging time)]

Example: 8-hour average concentration from excavating Area 2 = 5.3E-04 mg/m<sup>3</sup> × 0.7 × 7.1 hours/8 hours = 3.3E-04 mg/m<sup>3</sup>

24-hour average concentration = (SCREEN3 1-hour concentration) × (0.4 persistence factor) × [hours to excavate if less than 24) / (24 hours averaging time)]

f. U.S. 20, 1,850 m from Central Facilities Area

Table A-3. Airborne radionuclide release spreadsheet

Area	Soil Volume (yd <sup>3</sup> )	Soil Volume (m <sup>3</sup> )	Concentration (pCi/g) <sup>a</sup>						Curies Released <sup>b</sup>						Dose to Maximally Exposed Individual (mrem/yr)				
			Cs-137	Sr-90	U-234	U-235	U-238	Cs-137	Sr-90	U-234	U-235	U-238	Cs-137	Sr-90	U-234	U-235	U-238		
2	175	134	—	—	0.9	0.068	1.05	—	—	7.61E-09	5.75E-10	8.88E-09	—	—	2.4E-08	1.7E-09	2.4E-08		
2A	1,169	894	—	—	0.9	0.068	1.05	—	—	5.07E-08	3.83E-09	5.92E-08	—	—	1.6E-07	1.1E-08	1.6E-07		
5	140	107	0.374	—	4.3	0.581	5.94	2.52E-09	—	2.90E-08	3.92E-09	4.00E-08	4.0E-10	—	9.0E-08	1.2E-08	1.1E-07		
6	1,103	844	0.245	—	9.72	1.13	13.8	1.30E-08	—	5.17E-07	6.01E-08	7.34E-07	2.1E-09	—	1.6E-06	1.8E-07	2.0E-06		
7	1,981	1,516	0.501	—	13.3	1.22	21.8	4.78E-08	—	1.27E-06	1.16E-07	2.08E-06	7.6E-09	—	3.9E-06	3.4E-07	5.7E-06		
8	1,492	1,142	0.101	0.453	10.9	10.7	21.9	7.26E-09	3.26E-08	7.84E-07	7.70E-07	1.58E-06	1.2E-09	3.4E-09	2.4E-06	2.3E-06	4.3E-06		
11	2,673	2,045	1.45	—	2.45	0.43	2.98	1.87E-07	—	3.16E-07	5.54E-08	3.84E-07	3.0E-08	—	9.8E-07	1.6E-07	1.1E-06		
12	241	184	1.45	—	2.45	0.43	2.98	1.68E-08	—	2.84E-08	4.98E-09	3.45E-08	2.7E-09	—	8.8E-08	1.5E-08	9.5E-08		
13	455	348	1.45	—	2.45	0.43	2.98	3.18E-08	—	5.37E-08	9.42E-09	6.53E-08	5.1E-09	—	1.7E-07	2.8E-08	1.8E-07		
14	1,167	892	1.45	—	2.45	0.43	2.98	8.15E-08	—	1.38E-07	2.42E-08	1.68E-07	1.3E-08	—	4.3E-07	7.1E-08	4.6E-07		
													SUM	<b>4.9E-08</b>	<b>3.4E-09</b>	<b>9.5E-06</b>	<b>1.4E-05</b>		
															<b>Total dose (mrem)</b>	<b>2.6E-05</b>			
															<b>Unit Ci Doses (mrem/yr/Ci released)</b>				
															<b>Cs-137</b>	<b>Sr-90</b>	<b>U-234</b>	<b>U-235</b>	<b>U-238</b>
															<b>1.59E-01</b>	<b>1.03E-01</b>	<b>3.10E+00</b>	<b>2.94E+00</b>	<b>2.76E+00</b>

a Assumes uniform distribution of radionuclide in soil volume at stated concentration

Radiobiological contaminant concentrations in Areas 2, 5, 6, 7 and 8 are maximum values from connected samples collected at various depth intervals.

Contaminant concentrations in Areas 11–14 are averages from areas with measurable radiation and were taken from the Operable Unit 4-13 Remedial Investigation/Feasibility Study Appendix B (DOE-ID 2000).

Assumes 2.1E-04 re-suspension rate and 80% reduction for watering ( $0.00021 \times 2 = 0.000042$ ) (AP-42) and soil density of 1.3 g/cc.

**APPENDIX B**

**SCREEN3 OUTPUT FILES FOR MERCURY MODELING**

BEE-Line SCREEN3 Version 3.20

08/01/02  
09:31:19

Input File: CFA04A02.DTA  
Output File: CFA04A02.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 2 - 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.680370E-07
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	36.5000
LENGTH OF SMALLER SIDE (M)	=	24.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
18.	5.200	6	1.0	1.0 100000	.00	31.
19.	5.249	6	1.0	1.0 10000.0	.00	30.
20.	5.297	6	1.0	1.0 10000.0	.00	30.
21.	5.345	6	1.0	1.0 10000.0	.00	30.
<b>22.</b>	<b>5.388</b>	6	1.0	1.0 10000.0	.00	32.
23.	5.232	6	1.0	1.0 10000.0	.00	33.
100.	.8893	6	1.0	1.0 10000.0	.00	25.
250.	.3231	6	1.0	1.0 10000.0	.00	0.
350.	.2018	6	1.0	1.0 10000.0	.00	0.
500.	.1170	6	1.0	1.0 10000.0	.00	0.
700.	.6829E-01	6	1.0	1.0 10000.0	.00	0.
1000.	.3929E-01	6	1.0	1.0 10000.0	.00	0.
1500.	.2123E-01	6	1.0	1.0 10000.0	.00	0.
1850.	.1543E-01	6	1.0	1.0 10000.0	.00	0.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	5.388	22.	0.

BEE-Line SCREEN3 Version 3.20

12/12/02  
14:42:38

Input File: CFA0402A.DTA  
Output File: CFA0402A.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 2A - 2002 REMEDIATION CALCS for J.Gyles, default me

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.994030E-09
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	115.0000
LENGTH OF SMALLER SIDE (M)	=	51.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
58.	.1116	6	1.0	1.0	10000.0	.00	8.
60.	.1122	6	1.0	1.0	10000.0	.00	18.
61.	.1125	6	1.0	1.0	10000.0	.00	18.
<b>62.</b>	<b>.1128</b>	6	1.0	1.0	10000.0	.00	20.
63.	.1128	6	1.0	1.0	10000.0	.00	22.
64.	.1086	6	1.0	1.0	10000.0	.00	24.
100.	.4624E-01	6	1.0	1.0	10000.0	.00	22.
250.	.1881E-01	6	1.0	1.0	10000.0	.00	9.
350.	.1375E-01	6	1.0	1.0	10000.0	.00	0.
500.	.9211E-02	6	1.0	1.0	10000.0	.00	0.
700.	.5892E-02	6	1.0	1.0	10000.0	.00	0.
1000.	.3590E-02	6	1.0	1.0	10000.0	.00	0.
1500.	.2009E-02	6	1.0	1.0	10000.0	.00	0.
1850.	.1474E-02	6	1.0	1.0	10000.0	.00	0.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1128	63.	0.

BEE-Line SCREEN3 Version 3.20

07/31/02  
14:41:45

Input File: CFA04A03.DTA  
Output File: CFA04A03.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 3 - 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.390210E-06
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	9.0000
LENGTH OF SMALLER SIDE (M)	=	8.4000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	U10M STAB (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
5.	17.01	6	1.0	1.0 10000.0	.00	43.
6.	17.78	6	1.0	1.0 10000.0	.00	42.
<b>7.</b>	<b>18.50</b>	6	1.0	1.0 10000.0	.00	43.
8.	15.24	6	1.0	1.0 10000.0	.00	43.
9.	12.97	6	1.0	1.0 10000.0	.00	43.
20.	5.557	6	1.0	1.0 10000.0	.00	42.
<b>48.</b>	<b>2.213</b>	6	1.0	1.0 10000.0	.00	39.
100.	.8423	6	1.0	1.0 10000.0	.00	31.
200.	.2825	6	1.0	1.0 10000.0	.00	31.
500.	.6164E-01	6	1.0	1.0 10000.0	.00	31.
700.	.3493E-01	6	1.0	1.0 10000.0	.00	31.
1000.	.1979E-01	6	1.0	1.0 10000.0	.00	31.
1500.	.1059E-01	6	1.0	1.0 10000.0	.00	31.
1850.	.7670E-02	6	1.0	1.0 10000.0	.00	32.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	18.50	7.	0.

BEE-Line SCREEN3 Version 3.20

07/31/02  
14:51:35

Input File: CFA04A04.DTA  
Output File: CFA04A04.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 4 - 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.211470E-07
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	62.0000
LENGTH OF SMALLER SIDE (M)	=	22.5000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
31.	1.927	6	1.0	1.0 10000.0	.00	12.
32.	1.938	6	1.0	1.0 10000.0	.00	12.
<b>33.</b>	<b>1.946</b>	6	1.0	1.0 10000.0	.00	15.
34.	1.898	6	1.0	1.0 10000.0	.00	20.
40.	1.259	6	1.0	1.0 10000.0	.00	19.
<b>63.</b>	<b>.7149</b>	6	1.0	1.0 10000.0	.00	15.
100.	.4575	6	1.0	1.0 10000.0	.00	5.
250.	.1649	6	1.0	1.0 10000.0	.00	0.
350.	.1018	6	1.0	1.0 10000.0	.00	0.
500.	.5853E-01	6	1.0	1.0 10000.0	.00	0.
700.	.3398E-01	6	1.0	1.0 10000.0	.00	0.
1000.	.1950E-01	6	1.0	1.0 10000.0	.00	0.
1500.	.1052E-01	6	1.0	1.0 10000.0	.00	0.
1850.	.7644E-02	6	1.0	1.0 10000.0	.00	0.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1.946	33.	0.

BEE-Line SCREEN3 Version 3.20

07/31/02  
14:2:47

Input File: CFA04A05.DTA  
Output File: CFA04A05.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 5, 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.888020E-07
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	65.5000
LENGTH OF SMALLER SIDE (M)	=	10.9000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX H (M)	PLUME HT (M)	MAX DIR (DEG)
20.	7.602	6	1.0	1.0	10000.0	.00	1.
33.	8.194	6	1.0	1.0	10000.0	.00	0.
34.	8.126	6	1.0	1.0	10000.0	.00	7.
50.	3.932	6	1.0	1.0	10000.0	.00	0.
70.	2.661	6	1.0	1.0	10000.0	.00	0.
100.	1.707	6	1.0	1.0	10000.0	.00	0.
200.	.5995	6	1.0	1.0	10000.0	.00	0.
250.	.4177	6	1.0	1.0	10000.0	.00	0.
350.	.2400	6	1.0	1.0	10000.0	.00	0.
500.	.1321	6	1.0	1.0	10000.0	.00	0.
700.	.7504E-01	6	1.0	1.0	10000.0	.00	0.
1000.	.4251E-01	6	1.0	1.0	10000.0	.00	0.
1500.	.2276E-01	6	1.0	1.0	10000.0	.00	0.
1850.	.1649E-01	6	1.0	1.0	10000.0	.00	0.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	8.194	33.	0.

BEE-Line SCREEN3 Version 3.20

07/31/02  
14:56:15

Input File: CFA04A06.DTA  
Output File: CFA04A06.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 6, 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.970390E-07
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	19.0000
LENGTH OF SMALLER SIDE (M)	=	16.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAXDIR (DEG)
10.	5.889	6	1.0	1.0	10000.0	.00	39.
12.	6.109	6	1.0	1.0	10000.0	.00	39.
<b>13.</b>	<b>6.214</b>	6	1.0	1.0	10000.0	.00	39.
14.	5.565	6	1.0	1.0	10000.0	.00	40.
20.	3.272	6	1.0	1.0	10000.0	.00	40.
<b>35.</b>	<b>1.822</b>	6	1.0	1.0	10000.0	.00	39.
100.	.6164	6	1.0	1.0	10000.0	.00	31.
200.	.2516	6	1.0	1.0	10000.0	.00	0.
350.	.1074	6	1.0	1.0	10000.0	.00	0.
500.	.6024E-01	6	1.0	1.0	10000.0	.00	7.
700.	.3450E-01	6	1.0	1.0	10000.0	.00	5.
1000.	.1967E-01	6	1.0	1.0	10000.0	.00	9.
1500.	.1057E-01	6	1.0	1.0	10000.0	.00	18.
1850.	.7657E-02	6	1.0	1.0	10000.0	.00	14.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	6.214	13.	0.

BEE-Line SCREEN3 Version 3.20

07/31/02  
14:57:38

Input File: CFA04A07.DTA  
Output File: CFA04A07.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 7, 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.259320E-07
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	36.0000
LENGTH OF SMALLER SIDE (M)	=	31.6000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
18.	2.020	6	1.0	1.0 10000.0	.00	40.
23.	2.107	6	1.0	1.0 10000.0	.0	40.
<b>24.</b>	<b>2.124</b>	6	1.0	1.0 10000.0	.00	40.
25.	2.086	6	1.0	1.0 10000.0	.00	41.
<b>31.</b>	<b>1.314</b>	6	1.0	1.0 10000.0	.00	41.
100.	.3750	6	1.0	1.0 10000.0	.00	39.
200.	.1812	6	1.0	1.0 10000.0	.00	34.
250.	.1401	6	1.0	1.0 10000.0	.00	30.
350.	.9137E-01	6	1.0	1.0 10000.0	.00	17.
500.	.5508E-01	6	1.0	1.0 10000.0	.00	0.
700.	.3284E-01	6	1.0	1.0 10000.0	.00	5.
1000.	.1916E-01	6	1.0	1.0 10000.0	.00	6.
1500.	.1043E-01	6	1.0	1.0 10000.0	.00	4.
1850.	.7593E-02	6	1.0	1.0 10000.0	.00	10.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	2.124	24.	0.

BEE-Line SCREEN3 Version 3.20

07/31/02  
14:58:41

Input File: CFA04A08.DTA  
Output File: CFA04A08.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 8, 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.344670E-07
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	31.7000
LENGTH OF SMALLER SIDE (M)	=	27.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	U10M STAB (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
16.	2.554	6	1.0	1.0 10000.0	.00	39.
18.	2.607	6	1.0	1.0 10000.0	.00	39.
20.	2.657	6	1.0	1.0 10000.0	.00	39.
<b>21.</b>	<b>2.682</b>	6	1.0	1.0 10000.0	.00	39.
22.	2.574	6	1.0	1.0 10000.0	.00	40.
<b>30.</b>	<b>1.467</b>	6	1.0	1.0 10000.0	.00	40.
100.	.4217	6	1.0	1.0 10000.0	.00	37.
200.	.1987	6	1.0	1.0 10000.0	.00	28.
350.	.9658E-01	6	1.0	1.0 10000.0	.00	0.
500.	.5684E-01	6	1.0	1.0 10000.0	.00	3.
700.	.3343E-01	6	1.0	1.0 10000.0	.00	5.
1000.	.1936E-01	6	1.0	1.0 10000.0	.00	0.
1500.	.1048E-01	6	1.0	1.0 10000.0	.00	6.
1850.	.7619E-02	6	1.0	1.0 10000.0	.00	7.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	2.682	21.	0.

BEE-Line SCREEN3 Version 3.20

07/31/02  
15:00:01

Input File: CFA04A09.DTA  
Output File: CFA04A09.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 9 - 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.143760E-06
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	19.0000
LENGTH OF SMALLER SIDE (M)	=	10.8000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = 000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
10.	8.476	6	1.0	1.0	10000.0	.00	25.
11.	<b>8.650</b>	6	1.0	1.0	10000.0	.00	25.
12.	8.527	6	1.0	1.0	10000.0	.00	29.
13.	7.217	6	1.0	1.0	10000.0	.00	29.
18.	<b>4.617</b>	6	1.0	1.0	10000.0	.00	28.
20.	4.108	6	1.0	1.0	10000.0	.00	27.
50.	1.656	6	1.0	1.0	10000.0	.00	16.
100.	.76667	6	1.0	1.0	10000.0	.00	0.
350.	.11111	6	1.0	1.0	10000.0	.00	0.
500.	.6133E-01	6	1.0	1.0	10000.0	.00	0.
700.	.3484E-01	6	1.0	1.0	10000.0	.00	0.
1000.	.1976E-01	6	1.0	1.0	10000.0	.00	0.
1500.	.1059E-01	6	1.0	1.0	10000.0	.00	0.
1850.	.7670E-02	6	1.0	1.0	10000.0	.00	0.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	8.650	11.	0.

BEE-Line SCREEN3 Version 3.20

07/31/02  
15:01:47

Input File: CFA04A10.DTA  
Output File: CFA04A10.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 10, 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.359270E-07
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	69.0000
LENGTH OF SMALLER SIDE (M)	=	11.9000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
35.	<b>3.381</b>	6	1.0	1.0 10000.0	.00	0.
36.	3.296	6	1.0	1.0 10000.0	.00	9.
40.	2.405	6	1.0	1.0 10000.0	.00	1.
<b>50.</b>	<b>1.718</b>	6	1.0	1.0 10000.0	.00	0.
75.	1.075	6	1.0	1.0 10000.0	.00	0.
100.	.7603	6	1.0	1.0 10000.0	.00	0.
200.	.2752	6	1.0	1.0 10000.0	.00	0.
250.	.1926	6	1.0	1.0 10000.0	.00	0.
350.	.1111	6	1.0	1.0 1000.0	.00	0.
500.	.6129E-01	6	1.0	1.0 10000.0	.00	0.
700.	.3485E-01	6	1.0	1.0 10000.0	.00	1.
1000.	.1977E-01	6	1.0	1.0 10000.0	.00	1.
1500.	.1059E-01	6	1.0	1.0 10000.0	.00	1.
1850.	.7672E-02	6	1.0	1.0 10000.0	.00	0.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	3.381	35.	0.

BEE-Line SCREEN3 Version 3.20

07/31/02  
15:03:02

Input File: CFA04A12.DTA  
Output File: CFA04A12.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 12, 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.1059E-06
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	24.0000
LENGTH OF SMALLER SIDE (M)	=	11.6000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
12.	6.786	6	1.0	1.0	10000.0	.00	20.
<b>14.</b>	<b>6.992</b>	6	1.0	1.0	10000.0	.00	23.
15.	6.150	6	1.0	1.0	10000.0	.00	25.
20.	3.946	6	1.0	1.0	10000.0	.00	24.
<b>54.</b>	<b>1.444</b>	6	1.0	1.0	10000.0	.00	10.
100.	.7417	6	1.0	1.0	100000	.00	0.
200.	.2717	6	1.0	1.0	10000.0	.00	0.
250.	.1911	6	1.0	1.0	10000.0	.00	0.
350.	.1106	6	1.0	1.0	10000.0	.00	0.
500.	.6116E-01	6	1.0	1.0	10000.0	.00	0.
700.	.3479E-01	6	1.0	1.0	10000.0	.00	0.
1000.	.1976E-01	6	1.0	1.0	10000.0	.00	0.
1500.	.1058E-01	6	1.0	1.0	10000.0	.00	0.
1850.	.7670E-02	6	1.0	1.0	10000.0	.00	0.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	6.992	14.	0

BEE-Line SCREEN3 Version 3.20

07/31/02  
15:05:21

Input File: CFA04A13.DTA  
Output File: CFA04A13.LST

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

CFA04, AREA 13, 2002 REMEDIATION CALCS for J.Gyles, default met

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/ (S-M**2))	=	.646910E-07
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	30.0000
LENGTH OF SMALLER SIDE (M)	=	15.2000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M\*\*4/S\*\*3; MOM. FLUX = .000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN DISCRETE DISTANCES \*\*\*  
\*\*\*\*\*

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	4.550	6	1.0	1.0	10000.0	.00	23.
16.	4.607	6	1.0	1.0	10000.0	.00	23.
<b>17.</b>	<b>4.659</b>	6	1.0	1.0	10000.0	.00	24.
18.	4.441	6	1.0	1.0	10000.0	.00	27.
<b>41.</b>	<b>1.498</b>	6	1.0	1.0	10000.0	.00	22.
100.	.6283	6	1.0	1.0	10000.0	.00	0.
200.	.2559	6	1.0	1.0	10000.0	.00	0.
250.	.1834	6	1.0	1.0	10000.0	.00	0.
350.	.1081	6	1.0	1.0	10000.0	.00	0.
500.	.6046E-01	6	1.0	1.0	10000.0	.00	0.
700.	.3458E-01	6	1.0	1.0	10000.0	.00	0.
1000.	.1969E-01	6	1.0	1.0	10000.0	.00	0.
1500.	.1057E-01	6	1.0	1.0	10000.0	.00	0.
1850.	.7658E-02	6	1.0	1.0	10000.0	.00	0.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	4.659	17.	0.

**APPENDIX C**

**CAP-88 OUTPUT FILE FOR RADIONUCLIDE DOSE  
MODELING**

1INEL IMPLEMENTATION OF THE CAP88 COMPUTER CODE SYSTEM

THE DATE AND TIME ARE: Thu Aug 1 10:38:20 MDT 2002

USER NAME: Chris Staley

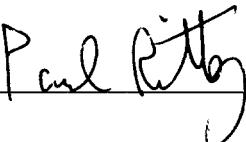
USER ID: cst

THE UNIX ABSOLUTE PATH FOR THIS RUN IS: /export/home/fierbolt3/cst/02unit/cfa

THE FILES USED BY THIS RUN ARE:

	Owner-Id	Date	Time	File Name
CAP88 OUTPUT FILE:	cst	Aug 1	10:38	/export/home/fierbolt3/cst/02unit/cfa/cfaunit.cap
PREPAR FILE:	cst	Aug 1	10:37	/export/home/fierbolt3/cst/02unit/cfa/cfaunit.dat
DARTAB FILE:	cst	Aug 1	10:35	inddar.dat
WIND FILE:	pdr	Oct 1	1997	/export/home/fierbolt3/pdr/10ywind/CFA.STR
FARM FILE:	pdr	Mar 8	1995	
/export/home/fierbolt3/pdr/cary_smith_cap88/farm/cowveg2.dat				
POPULATION FILE:	pdr	Mar 8	1995	
/export/home/fierbolt3/pdr/cary_smith_cap88/pop/nrf.90				
ALLRAD DATA BASE:	pdr	Jan 30	1995	
/export/home/fierbolt3/pdr/cary_smith_cap88/radrisk/allrad88.dat				
RADRISK DATA BASE:	pdr	Mar 22	2001	
/export/home/fierbolt3/pdr/cary_smith_cap88/radrisk/rad.new				

PREPARED BY:  DATE: 1/30/03

REVIEWED BY:  DATE: 1/30/03

1

ALLRAD FILE =====> ALLRAD88 CONTAINS THE DCFs  
POP FILE =====> CONTAINS THE POPULATION GRID (POP RUNS ONLY)

1

SYNOPSIS REPORT - CAP-88 (1.00)

ID Code: Date/Time: Thu Aug 1 10:38:16 2002

FACILITY: IDAHO NATIONAL ENGINEERING & ENVIRONMENTAL LABORATORY

ADDRESS: BECHTEL BWXT LLC APPLIED GEOSCIENCES DEPARTMENT

CITY: IDAHO FALLS

State: ID Zipcode: 83415-2107

Source Category: CFA UNIT Ci GROUND RELEASES Source Term: 2002

Comments:

UNIT CI RELEASES FOR CFA-04 EXCAVATION PROJECT

RECEPTOR AT MAXIMUM INEEL BOUNDARY LOCATION

INDIVIDUAL AT MAXIMUM RISK ASSESSMENT  
(RN-222 RISKS EXCLUDED)

Location to the individual: 9600 METERS SOUTH SOUTHWEST

ORGAN DOSE (MRREM/YR)	GONADS	BREAST	R MAR	LUNGS	THYROID	ENDOST	RMNDR
	2.8E-01	2.8E-01	1.4E+00	6.8E+01	2.8E-01	1.1E+01	1.1E+00

ICRP Effective Dose Equivalent (mrem/yr): 9.07E+00  
Lifetime Fatal Cancer Risk : 1.19E-04

Stack #1  
SOURCE TERM (2002)

Nuclide	Class	Amad	Stack #1	
			Ci/yr	TOTAL
SR-90	D	1.00	1.00E+00	1.00E+00
Y-90	Y	1.00	1.00E+00	1.00E+00
CS-137	D	1.00	1.00E+00	1.00E+00
BA-137M	D	1.00	1.00E+00	1.00E+00
U-234	Y	1.00	1.00E+00	1.00E+00
U-235	Y	1.00	1.00E+00	1.00E+00
U-238	Y	1.00	1.00E+00	1.00E+00

SITE INFORMATION

Temperature: 6 C  
 Rainfall: 21 cm/yr  
 Mixing Height: 800 meters

EMISSION INFORMATION

Stack Number: 1

-----

STACK HEIGHT (METERS) : .00  
 STACK DIAMETER (METERS) : .00  
 PLUME RISE  
 MOMENTUM (M/SEC) : .00E+00

1

ID CODE: 11111111111111111111 DATE/TIME:Thu Aug 1 10:38:16 2002

PAGE 2

FOOD SUPPLY FRACTIONS

	LOCAL	REGIONAL	IMPORTED
Vegetable:	.700	.300	.000
Meat:	.442	.558	.000
Milk:	.399	.601	.000

FOOD ARRAYS WERE NOT GENERATED OR SUPPLIED FOR THIS RUN . DEFAULT VALUES USED.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

9600

REFERENCE FILE NAMES FOR ASSESSMENT

```

STARFILE      ==> INEEL MESONET DATA
RADRISK FILE  ==> EPA
1            DATE Thu Aug 1 10:38:16 2002
0 MAIN OPTIONS:
0    CONCEN AND DOSEN          OPTION(1)=0
0    CIRCULAR GRID             OPTION(2)=1
0 CONCEN OPTIONS:
0    SECTOR-AVERAGED          OPTION(3)=0
0    MOMENTUM-TYPE PLUME       OPTION(4)=1
0    FIXED DEPOSITION VELOCITY OPTION(5)=0
0    NO PUNCH, CONCEN         OPTION(6)=0
0    POINT SOURCE              OPTION(7)=0
0    NO PRINT CONCEN MAIN TABLE OPTION(8)=1
0    PRINT CONCEN CHI/Q TABLES OPTION(9)=0
0 DOSEN OPTIONS:
0    INDIVIDUAL ASSESSMENT     LIPO=0
0    NO PRINT DOSEN TABLES    NNTB=0
0    NO PUNCH DOSES           NRTB=0

```

0 NO DARTAB OUTPUT NSTB=0  
 0 PRINT DOSE SUMMARY NTTB=1  
 0 NO RN-222 WORKING LEVELS NUTB=0  
 0 READ ORGAN NAMES NVTB=1  
 0 BUILDUP TIME IN SOIL TSUBB= 100.0 YEARS  
 T=3.6524E+04 DAYS  
 1 DATE Thu Aug 1 10:38:16 2002  
 0 GRID DATA:  
 0      BOUNDS OF DIRECTION-INDICES NOL= 8 NOU= 8  
 0      BOUNDS OF DISTANCE-INDICES NRL= 1 NRU= 1  
 0 SQSD= 960.0 (M), COMPUTED FROM IDIST( 1)= 9600 (M)  
 0 IDIST, THE ARRAY OF RADIAL DISTANCES (M)  
 9600  
 1 DATE Thu Aug 1 10:38:16 2002  
 0 NUMBER OF SOURCES NUMST=1  
 0 NUMBER OF NUCLIDES NNUCS= 7  
 0 SOURCE #: 1  
  
 HEIGHT PH=.0  
 DIAMETER DIA=.00  
 EXIT VELOCITY VEL=.0.  
 HEAT RELEASE RATE QH=.0.  
 NUCLIDE RELEASE RATE, REL (CI/YR)

1	SR-90	1.000
2	Y-90	1.000
3	CS-137	1.000
4	BA-137M	1.000
5	U-234	1.000
6	U-235	1.000
7	U-238	1.000

1 DATE Thu Aug 1 10:38:16 2002  
 0 INDEX NAME ISOL LAMSUR UPTAKE AMAD  
 CLASS 1/D F1ING MICRONS

1	SR-90	D	5.48E-05	.30	1.00
2	Y-90	Y	5.48E-05	.00	1.00
3	CS-137	D	5.48E-05	.95	1.00
4	BA-137M	D	5.48E-05	.10	1.00
5	U-234	Y	5.48E-05	.20	1.00
6	U-235	Y	5.48E-05	.20	1.00
7	U-238	Y	5.48E-05	.20	1.00

INDEX NAME SC VD VG ANLAM  
 1/S M/S M/S 1/D

1	SR-90	2.08E-06	1.80E-03	3.55E-05	6.64E-05
2	Y-90	2.08E-06	1.80E-03	3.55E-05	6.64E-05
3	CS-137	2.08E-06	1.80E-03	3.55E-05	6.29E-05
4	BA-137M	2.08E-06	1.80E-03	3.55E-05	6.29E-05
5	U-234	2.08E-06	1.80E-03	3.55E-05	7.76E-09
6	U-235	2.08E-06	1.80E-03	3.55E-05	2.70E-12
7	U-238	2.08E-06	1.80E-03	3.55E-05	4.25E-13

0 \*\*\*NOTE: VG SET TO ZERO FOR AIRDOS UNLESS GREATER THAN 1.000E-02  
 0 \*\*\*NOTE: ANLAM SET TO ZERO FOR AIRDOS UNLESS GREATER THAN 1.000E-02  
 1 DATE Thu Aug 1 10:38:16 2002  
 0 FOR EACH STABILITY CLASS

A	B	C	D	E	F	G	PERD	
OUDCAT, HARMONIC AVERAGE WIND SPEEDS ( WIND TOWARDS ) WIND FREQ.								
N	1.393	2.606	2.915	3.713	2.409	1.199	.000	.042
NNW	1.286	2.127	2.605	3.016	2.115	1.114	.000	.029
NW	1.195	2.042	2.569	2.842	2.098	1.157	.000	.018
WNW	1.152	1.799	2.695	2.587	1.520	1.036	.000	.016
W	1.145	1.898	1.841	2.498	2.073	1.065	.000	.020
WSW	1.223	1.938	2.338	3.572	2.381	1.142	.000	.045
SW	1.243	1.823	2.068	3.144	2.389	1.212	.000	.107
SSW	1.163	1.600	1.899	2.853	2.289	1.233	.000	.104
S	1.179	1.882	2.155	2.597	1.830	1.188	.000	.052
SSE	1.122	1.653	2.000	2.098	1.659	1.115	.000	.035
SE	1.166	2.065	3.065	2.394	1.730	1.138	.000	.036

ESE	1.211	2.095	2.864	2.660	1.895	1.210	.000	.044
E	1.302	2.227	3.111	3.203	2.170	1.237	.000	.071
ENE	1.437	2.646	3.477	5.347	2.726	1.274	.000	.169
NE	1.512	2.856	3.733	5.816	2.819	1.232	.000	.149
NNE	1.536	2.848	3.588	4.140	2.489	1.240	.000	.063

OUDAV, ARITHMETIC AVERAGE WIND SPEEDS ( WIND TOWARDS )

N	1.919	3.121	3.693	4.825	3.046	1.688	.000
NNW	1.800	2.809	3.499	3.854	2.758	1.562	.000
NW	1.683	2.770	3.492	3.684	2.703	1.628	.000
WNW	1.621	2.638	3.700	3.600	2.122	1.427	.000
W	1.611	2.610	2.950	3.635	2.847	1.480	.000
WSW	1.721	2.545	3.185	4.616	3.187	1.606	.000
SW	1.748	2.483	2.863	4.173	3.045	1.706	.000
SSW	1.637	2.334	2.693	3.883	2.908	1.734	.000
S	1.660	2.688	3.229	4.184	2.509	1.673	.000
SSE	1.575	2.518	3.392	3.418	2.243	1.564	.000
SE	1.642	3.018	4.081	3.783	2.281	1.600	.000
ESE	1.705	2.904	3.973	3.736	2.463	1.704	.000
E	1.820	3.096	4.119	4.575	2.827	1.739	.000
ENE	1.963	3.239	4.103	6.901	3.407	1.785	.000
NE	2.031	3.321	4.238	7.055	3.488	1.732	.000
NNE	2.052	3.302	4.155	5.362	3.167	1.743	.000

1 DATE Thu Aug 1 10:38:16 2002

0 FOR EACH STABILITY CLASS

	A	B	C	D	E	F	G
OFRAW, FREQUENCIES OF STABILITY CLASSES ( WIND TOWARDS )							
N	1.73E-01	6.05E-02	7.30E-02	3.38E-01	1.24E-01	2.32E-01	.00E+00
NNW	2.42E-01	6.00E-02	7.07E-02	2.44E-01	1.20E-01	2.64E-01	.00E+00
NW	3.55E-01	4.48E-02	5.14E-02	1.68E-01	9.02E-02	2.91E-01	.00E+00
WNW	4.35E-01	5.14E-02	2.95E-02	1.02E-01	5.52E-02	3.27E-01	.00E+00
W	3.69E-01	4.87E-02	4.36E-02	1.36E-01	9.74E-02	3.05E-01	.00E+00
WSW	2.02E-01	6.02E-02	7.78E-02	3.60E-01	1.32E-01	1.68E-01	.00E+00
SW	7.70E-02	3.97E-02	7.74E-02	5.53E-01	1.50E-01	1.03E-01	.00E+00
SSW	6.90E-02	2.84E-02	5.41E-02	4.96E-01	2.12E-01	1.41E-01	.00E+00
S	9.11E-02	3.31E-02	4.50E-02	3.49E-01	1.93E-01	2.88E-01	.00E+00
SSE	1.11E-01	2.82E-02	3.53E-02	1.98E-01	1.68E-01	4.60E-01	.00E+00
SE	1.09E-01	2.95E-02	3.37E-02	2.05E-01	1.53E-01	4.71E-01	.00E+00
ESE	8.80E-02	2.61E-02	3.48E-02	2.84E-01	1.81E-01	3.86E-01	.00E+00
E	5.66E-02	2.76E-02	4.12E-02	4.30E-01	2.27E-01	2.17E-01	.00E+00
ENE	3.44E-02	2.19E-02	4.17E-02	6.66E-01	1.38E-01	9.87E-02	.00E+00
NE	4.72E-02	3.75E-02	6.85E-02	6.54E-01	9.60E-02	9.72E-02	.00E+00
NNE	1.32E-01	6.51E-02	8.53E-02	3.98E-01	1.13E-01	2.06E-01	.00E+00
TOT	1.01E-01	3.71E-02	5.67E-02	4.66E-01	1.47E-01	1.92E-01	.00E+00

0 HEIGHT OF LID

LIDAI= 800 (M)

0 RAINFALL RATE

RR= 20.8 (CM/Y)

0 AVERAGE AIR TEMPERATURE

0 TA= 5.8 (DEG C) 279.0 (K)

0 SURFACE ROUGHNESS LENGTH

Z0= .010 (M)

0 HEIGHT OF WIND MEASUREMENTS

Z= 10.0 (M)

0 AVERAGE WIND SPEED

UBAR= 3.81 (M/S)

0 VERTICAL TEMPERATURE GRADIENTS: (TG) (K/M)

STABILITY E .073

STABILITY F .109

STABILITY G .145

1 DATE Thu Aug 1 10:38:16 2002

0STAR INPUT, WIND FREQUENCIES ( WIND FROM )

OCLASS: A

N	2.380E-03	2.320E-03	.000E+00	.000E+00	.000E+00	.000E+00
NNE	3.720E-03	3.440E-03	.000E+00	.000E+00	.000E+00	.000E+00
NE	3.760E-03	4.450E-03	.000E+00	.000E+00	.000E+00	.000E+00
ENE	4.270E-03	4.760E-03	.000E+00	.000E+00	.000E+00	.000E+00
E	3.840E-03	3.350E-03	.000E+00	.000E+00	.000E+00	.000E+00
ESE	3.660E-03	3.270E-03	.000E+00	.000E+00	.000E+00	.000E+00
SE	3.210E-03	3.290E-03	.000E+00	.000E+00	.000E+00	.000E+00
SSE	3.020E-03	4.020E-03	.000E+00	.000E+00	.000E+00	.000E+00

S	2.660E-03	4.670E-03	.000E+00	.000E+00	.000E+00	.000E+00
SSW	2.410E-03	5.930E-03	.000E+00	.000E+00	.000E+00	.000E+00
SW	2.120E-03	4.930E-03	.000E+00	.000E+00	.000E+00	.000E+00
WSW	1.970E-03	3.850E-03	.000E+00	.000E+00	.000E+00	.000E+00
W	1.680E-03	2.340E-03	.000E+00	.000E+00	.000E+00	.000E+00
WNW	1.850E-03	1.990E-03	.000E+00	.000E+00	.000E+00	.000E+00
NW	2.000E-03	1.870E-03	.000E+00	.000E+00	.000E+00	.000E+00
NNW	2.160E-03	1.740E-03	.000E+00	.000E+00	.000E+00	.000E+00

## OCLASS: B

N	3.500E-04	9.000E-04	4.600E-04	.000E+00	.000E+00	.000E+00
NNE	8.500E-04	1.640E-03	4.600E-04	.000E+00	.000E+00	.000E+00
NE	8.600E-04	2.720E-03	6.500E-04	.000E+00	.000E+00	.000E+00
ENE	4.500E-04	1.830E-03	4.100E-04	.000E+00	.000E+00	.000E+00
E	1.800E-04	5.700E-04	2.000E-04	.000E+00	.000E+00	.000E+00
ESE	1.900E-04	4.100E-04	2.200E-04	.000E+00	.000E+00	.000E+00
SE	1.300E-04	4.700E-04	2.200E-04	.000E+00	.000E+00	.000E+00
SSE	2.400E-04	1.040E-03	4.700E-04	.000E+00	.000E+00	.000E+00
S	1.500E-04	1.480E-03	9.300E-04	.000E+00	.000E+00	.000E+00
SSW	1.500E-04	2.150E-03	1.820E-03	.000E+00	.000E+00	.000E+00
SW	2.100E-04	2.850E-03	2.540E-03	.000E+00	.000E+00	.000E+00
WSW	2.400E-04	1.850E-03	1.610E-03	.000E+00	.000E+00	.000E+00
W	2.800E-04	8.300E-04	8.500E-04	.000E+00	.000E+00	.000E+00
WNW	1.800E-04	5.700E-04	3.900E-04	.000E+00	.000E+00	.000E+00
NW	1.900E-04	4.100E-04	4.500E-04	.000E+00	.000E+00	.000E+00
NNW	2.800E-04	4.600E-04	2.500E-04	.000E+00	.000E+00	.000E+00

## OCLASS: C

N	3.900E-04	8.800E-04	9.200E-04	1.300E-04	.000E+00	.000E+00
NNE	1.090E-03	3.240E-03	1.150E-03	1.300E-04	.000E+00	.000E+00
NE	1.300E-03	4.560E-03	2.220E-03	1.700E-04	.000E+00	.000E+00
ENE	4.200E-04	1.570E-03	1.410E-03	8.000E-05	.000E+00	.000E+00
E	2.100E-04	2.800E-04	3.400E-04	2.000E-05	.000E+00	.000E+00
ESE	5.000E-05	9.000E-05	3.200E-04	1.000E-05	.000E+00	.000E+00
SE	9.000E-05	3.800E-04	4.000E-04	7.000E-05	.000E+00	.000E+00
SSE	2.000E-04	7.000E-04	1.090E-03	7.000E-05	.000E+00	.000E+00
S	1.900E-04	1.030E-03	1.700E-03	1.700E-04	.000E+00	.000E+00
SSW	1.600E-04	7.900E-04	4.130E-03	3.200E-04	.000E+00	.000E+00
SW	2.000E-04	1.640E-03	7.500E-03	8.900E-04	.000E+00	.000E+00
WSW	2.200E-04	1.430E-03	4.830E-03	5.700E-04	.000E+00	.000E+00
W	2.000E-04	5.700E-04	1.770E-03	3.900E-04	.000E+00	.000E+00
WNW	1.400E-04	3.000E-04	9.100E-04	1.700E-04	.000E+00	.000E+00
NW	9.000E-05	2.000E-04	7.800E-04	1.300E-04	.000E+00	.000E+00
NNW	2.900E-04	2.100E-04	6.600E-04	8.000E-05	.000E+00	.000E+00

1 DATE Thu Aug 1 10:38:16 2002  
 OSTAR INPUT, WIND FREQUENCIES ( WIND FROM )

## OCLASS: D

N	1.970E-03	7.580E-03	3.320E-03	3.820E-03	1.210E-03	1.300E-04
NNE	2.810E-03	2.588E-02	1.400E-02	6.030E-03	2.310E-03	4.700E-04
NE	2.570E-03	2.268E-02	2.207E-02	8.980E-03	2.200E-03	4.500E-04
ENE	4.800E-04	4.630E-03	6.220E-03	4.160E-03	5.800E-04	2.000E-05
E	3.100E-04	9.700E-04	1.030E-03	3.500E-04	.000E+00	.000E+00
ESE	1.400E-04	8.000E-04	4.300E-04	2.400E-04	.000E+00	1.000E-05
SE	1.700E-04	1.440E-03	1.080E-03	3.400E-04	4.000E-05	.000E+00
SSE	3.000E-04	3.150E-03	2.630E-03	8.900E-04	1.300E-04	1.000E-05
S	3.200E-04	4.280E-03	4.990E-03	3.640E-03	9.800E-04	9.000E-05
SSW	5.200E-04	5.140E-03	8.340E-03	8.870E-03	2.080E-03	2.700E-04
SW	4.300E-04	6.980E-03	2.256E-02	3.822E-02	2.028E-02	9.120E-03
WSW	1.290E-03	1.138E-02	2.598E-02	3.931E-02	2.395E-02	1.060E-02
W	1.530E-03	1.102E-02	9.730E-03	5.270E-03	2.250E-03	7.800E-04
WNW	9.700E-04	6.130E-03	3.310E-03	1.500E-03	4.300E-04	6.000E-05
NW	8.900E-04	3.620E-03	1.230E-03	1.100E-03	3.700E-04	8.000E-05
NNW	1.220E-03	3.290E-03	1.290E-03	8.800E-04	2.500E-04	1.000E-05

## OCLASS: E

N	2.030E-03	6.260E-03	1.680E-03	.000E+00	.000E+00	.000E+00
NNE	2.290E-03	1.328E-02	6.380E-03	.000E+00	.000E+00	.000E+00
NE	1.540E-03	8.720E-03	5.740E-03	.000E+00	.000E+00	.000E+00
ENE	6.800E-04	2.540E-03	2.700E-03	.000E+00	.000E+00	.000E+00
E	3.000E-04	1.010E-03	5.900E-04	.000E+00	.000E+00	.000E+00

ESE	2.700E-04	5.600E-04	5.000E-05	.000E+00	.000E+00	.000E+00
SE	2.200E-04	1.090E-03	3.400E-04	.000E+00	.000E+00	.000E+00
SSE	4.700E-04	2.190E-03	8.300E-04	.000E+00	.000E+00	.000E+00
S	4.800E-04	2.900E-03	1.860E-03	.000E+00	.000E+00	.000E+00
SSW	6.300E-04	3.530E-03	2.990E-03	.000E+00	.000E+00	.000E+00
SW	9.100E-04	5.220E-03	8.200E-03	.000E+00	.000E+00	.000E+00
WSW	1.630E-03	9.230E-03	1.242E-02	.000E+00	.000E+00	.000E+00
W	2.050E-03	9.770E-03	4.340E-03	.000E+00	.000E+00	.000E+00
WNW	1.370E-03	5.660E-03	8.900E-04	.000E+00	.000E+00	.000E+00
NW	1.190E-03	3.940E-03	3.100E-04	.000E+00	.000E+00	.000E+00
NNW	1.460E-03	4.060E-03	3.800E-04	.000E+00	.000E+00	.000E+00

OCLASS: F

N	7.430E-03	7.440E-03	.000E+00	.000E+00	.000E+00	.000E+00
NNE	6.790E-03	7.800E-03	.000E+00	.000E+00	.000E+00	.000E+00
NE	5.290E-03	5.700E-03	.000E+00	.000E+00	.000E+00	.000E+00
ENE	4.030E-03	3.480E-03	.000E+00	.000E+00	.000E+00	.000E+00
E	3.610E-03	2.340E-03	.000E+00	.000E+00	.000E+00	.000E+00
ESE	3.320E-03	1.900E-03	.000E+00	.000E+00	.000E+00	.000E+00
SE	2.790E-03	2.530E-03	.000E+00	.000E+00	.000E+00	.000E+00
SSE	4.320E-03	3.380E-03	.000E+00	.000E+00	.000E+00	.000E+00
S	4.810E-03	4.990E-03	.000E+00	.000E+00	.000E+00	.000E+00
SSW	6.020E-03	7.050E-03	.000E+00	.000E+00	.000E+00	.000E+00
SW	6.770E-03	7.740E-03	.000E+00	.000E+00	.000E+00	.000E+00
WSW	7.290E-03	9.390E-03	.000E+00	.000E+00	.000E+00	.000E+00
W	7.140E-03	8.290E-03	.000E+00	.000E+00	.000E+00	.000E+00
WNW	8.120E-03	8.720E-03	.000E+00	.000E+00	.000E+00	.000E+00
NW	9.050E-03	7.710E-03	.000E+00	.000E+00	.000E+00	.000E+00
NNW	9.050E-03	7.110E-03	.000E+00	.000E+00	.000E+00	.000E+00

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1      DATE Thu Aug  1 10:38:16 2002
0      NOBCT, NUMBER OF BEEF CATTLE
0      9600
      -----
SSW      4
1      DATE Thu Aug  1 10:38:16 2002
0      NOMCT, NUMBER OF MILK CATTLE
0      9600
      -----
SSW      2
1      DATE Thu Aug  1 10:38:16 2002
0      INTFC, AREA OF VEGETABLE CROP PRODUCTION (M**2)
0      9600
      -----
SSW      1.00E+04
1      DATE Thu Aug  1 10:38:16 2002

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0      INTPA, POPULATION
0      9600
      -----
SSW      1
CAA88.DATA(ALLRAD88) 09/07/88. ICRP H-SUB-E AND NEW FOOD XFR FACTORS.
TYPE=3 DOSE EQUIVALENT FACTOR (REM) SELECTED WITH Q= 20.0 AND TIME= 50.
11 AIRDOS ORGANS PAIRED WITH DARTAB-RADRISK ORGANS:
EFFEC    WT SUM
GONADS   GONADS
BREAST    BREAST
R MARROW  R MAR
LUNG     LUNGS
THYROID   THYROID
BON SURF  ENDOST
RMNDR    RMNDR
INT WALL  INT WALL
LIVER     LIVER
KIDNEYS  KIDNEYS

7 ORGANS AND WEIGHTS USED TO PRODUCE WEIGHTED-SUM
GONADS  2.500E-01
BREAST   1.500E-01
R MAR    1.200E-01
LUNGS   1.200E-01
THYROID  3.000E-02

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.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00	.000E+00
1	DATE Thu Aug 1 10:38:16 2002						
0	***OPTIONS SELECTED FOR DOSE AND INTAKE CALCULATIONS***						
0	CALCULATIONS ARE MADE FOR THE MAXIMALLY-EXPOSED INDIVIDUAL.						
0	TABLES FOR EACH NUCLIDE LISTING DOSES BY ORGAN AND PATHWAY						
0	AT EACH ENVIRONMENTAL LOCATION ARE OMITTED.						
0	ORGAN NAMES ARE INPUT.						
1	DATE Thu Aug 1 10:38:16 2002						
0	*VALUES FOR RADIONUCLIDE-INDEPENDENT VARIABLES*						
0	NUMBER OF NUCLIDES CONSIDERED 7						
0	TIME DELAY--INGESTION OF PASTURE GRASS BY ANIMALS (HR) .00E+00						
0	TIME DELAY--INGESTION OF STORED FEED BY ANIMALS (HR) .22E+04						
0	TIME DELAY--INGESTION OF LEAFY VEGETABLES BY MAN (HR) .34E+03						
0	TIME DELAY--INGESTION OF PRODUCE BY MAN (HR) .34E+03						
0	REMOVAL RATE CONSTANT FOR PHYSICAL LOSS BY						
	WEATHERING (PER HOUR) .29E-02						
0	PERIOD OF EXPOSURE DURING GROWING SEASON--PASTURE GRASS (HR) .72E+03						
0	PERIOD OF EXPOSURE DURING GROWING SEASON--						
	CROPS OR LEAFY VEGETABLES (HR) .14E+04						
0	AGRICULTURAL PRODUCTIVITY BY UNIT AREA						
	(GRASS-COW-MILK-MAN PATHWAY (KG/SQ. METER)) .28E+00						
0	AGRICULTURAL PRODUCTIVITY BY UNIT AREA						
	(PRODUCE OR LEAFY VEG INGESTED BY MAN (KG/SQ METER)) .72E+00						
0	FRACTION OF YEAR ANIMALS GRAZE ON PASTURE .40E+00						
0	FRACTION OF DAILY FEED THAT IS PASTURE GRASS						
	WHEN ANIMAL GRAZES ON PASTURE .43E+00						
0	CONSUMPTION RATE OF CONTAMINATED FEED OR FORAGE						
	BY AN ANIMAL IN KG/DAY (DRY WEIGHT) .16E+02						
0	TRANSPORT TIME FROM ANIMAL FEED-MILK-MAN (DAY) .20E+01						
0	RATE OF INGESTION OF PRODUCE BY MAN (KG/YR) .18E+03						
0	RATE OF INGESTION OF MILK BY MAN (LITERS/YR) .11E+03						
0	RATE OF INGESTION OF MEAT BY MAN (KG/YR) .85E+02						
0	RATE OF INGESTION OF LEAFY VEGETABLES BY MAN (KG/YR) .18E+02						
0	AVERAGE TIME FROM SLAUGHTER OF MEAT ANIMAL TO						
	CONSUMPTION (DAY) .20E+02						
0	FRACTION OF PRODUCE INGESTED GROWN IN GARDEN OF INTEREST .10E+01						
0	FRACTION OF LEAFY VEGETABLES GROWN IN GARDEN OF INTEREST .10E+01						
0	PERIOD OF LONG-TERM BUILDUP FOR ACTIVITY IN SOIL (YEARS) .10E+03						
0	EFFECTIVE SURFACE DENSITY OF SOILKG/SQ. M, DRY WEIGHT.						
	(ASSUMES 15 CM PLOW LAYER) .22E+03						
0	VEGETABLE INGESTION RATIO-IMMEDIATE						
	SURROUNDING AREA/TOTAL WITHIN AREA .70E+00						
0	MEAT INGESTION RATIO-IMMEDIATE						
	SURROUNDING AREA/TOTAL WITHIN AREA .44E+00						
0	MILK INGESTION RATIO-IMMEDIATE						
	SURROUNDING AREA/TOTAL WITHIN AREA .40E+00						
0	MINIMUM FRACTIONS OF FOOD TYPES FROM OUTSIDE AREA						
	LISTED BELOW ARE ACTUAL FIXED VALUES						
0	MINIMUM FRACTION VEGETABLES INGESTED FROM OUTSIDE AREA .00E+00						
0	MINIMUM FRACTION MEAT INGESTED FROM OUTSIDE AREA .00E+00						
0	MINIMUM FRACTION MILK INGESTED FROM OUTSIDE AREA .00E+00						
0	INHALATION RATE OF MAN (CUBIC CENTIMETERS/HR) .92E+06						
0	BUILDUP TIME FOR RADIONUCLIDES DEPOSITED						
	ON GROUND AND WATER (DAYS) .37E+05						
0	DILUTION FACTOR FOR WATER FOR SWIMMING (CM) .10E+01						
0	FRACTION OF TIME SPENT SWIMMING .00E+00						
0	MUSCLE MASS OF ANIMAL AT SLAUGHTER (KG) .20E+03						
0	FRACTION OF ANIMAL HERD SLAUGHTERED PER DAY .38E-02						
0	MILK PRODUCTION OF COW (LITERS/DAY) .11E+02						
0	FALLOUT INTERCEPTION FRACTION-VEGETABLES .20E+00						
0	FALLOUT INTERCEPTION FRACTION-PASTURE .57E+00						
0	FRACTION OF RADIOACTIVITY RETAINED ON LEAFY						
	VEGETABLES AND PRODUCE AFTER WASHING .50E+00						
1	DATE Thu Aug 1 10:38:16 2002						
0	*COMPUTED VALUES FOR THE AREA*						
0	TOTAL POPULATION 1.0						
0	TOTAL NUMBER OF MEAT ANIMALS 4						
0	TOTAL NUMBER OF MILK CATTLE 2						
0	TOTAL AREA OF VEGETABLE FOOD CROPS (SQUARE METERS) .10E+05						

0	TOTAL MEAT CONSUMPTION (KG PER YEAR)	.85E+02
0	TOTAL MEAT PRODUCTION (KG PER YEAR)	.11E+04
0	TOTAL MILK CONSUMPTION (LITERS/YEAR)	.11E+03
0	TOTAL MILK PRODUCTION (LITERS/YEAR)	.80E+04
0	TOTAL VEGETABLE FOOD CONSUMPTION (KG PER YEAR)	.19E+03
0	TOTAL VEGETABLE FOOD PRODUCED (KG PER YEAR)	.72E+04
1	DATE Thu Aug 1 10:38:16 2002	
0	*LIST OF INPUT DATA FOR NUCLIDE SR-90 *	
0	RADIOACTIVE DECAY CONSTANT (PER DAY)	.66E-04
0	ENVIRONMENTAL DECAY CONSTANT--SURFACE (PER DAY)	.55E-04
0	ENVIRONMENTAL DECAY CONSTANT--WATER (PER DAY)	.00E+00
0	AVERAGE FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH L OF MILK (DAYS/L)	.15E-02
0	FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH KG OF FLESH (DAYS/KG)	.30E-03
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL FOR PASTURE AND FORAGE (IN PCI/KG DRY WEIGHT PER PCI/KG DRY SOIL)	.25E+01
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL BY EDIBLE PARTS OF CROPS (IN PCI/KG WET WEIGHT PER PCI/KG DRY SOIL)	.11E+00
0	GI UPTAKE FRACTION (INHALATION)	.30E+00
0	GI UPTAKE FRACTION (INGESTION)	.30E+00
0	PARTICLE SIZE (MICRONS)	.10E+01
0	SOLUBILITY CLASS	D
1	DATE Thu Aug 1 10:38:16 2002	
0	*LIST OF INPUT DATA FOR NUCLIDE Y-90 *	
0	RADIOACTIVE DECAY CONSTANT (PER DAY)	.66E-04
0	ENVIRONMENTAL DECAY CONSTANT--SURFACE (PER DAY)	.55E-04
0	ENVIRONMENTAL DECAY CONSTANT--WATER (PER DAY)	.00E+00
0	AVERAGE FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH L OF MILK (DAYS/L)	.20E-04
0	FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH KG OF FLESH (DAYS/KG)	.30E-03
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL FOR PASTURE AND FORAGE (IN PCI/KG DRY WEIGHT PER PCI/KG DRY SOIL)	.15E-01
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL BY EDIBLE PARTS OF CROPS (IN PCI/KG WET WEIGHT PER PCI/KG DRY SOIL)	.26E-02
0	GI UPTAKE FRACTION (INHALATION)	.10E-03
0	GI UPTAKE FRACTION (INGESTION)	.10E-03
0	PARTICLE SIZE (MICRONS)	.10E+01
0	SOLUBILITY CLASS	Y
1	DATE Thu Aug 1 10:38:16 2002	
0	*LIST OF INPUT DATA FOR NUCLIDE CS-137 *	
0	RADIOACTIVE DECAY CONSTANT (PER DAY)	.63E-04
0	ENVIRONMENTAL DECAY CONSTANT--SURFACE (PER DAY)	.55E-04
0	ENVIRONMENTAL DECAY CONSTANT--WATER (PER DAY)	.00E+00
0	AVERAGE FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH L OF MILK (DAYS/L)	.70E-02
0	FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH KG OF FLESH (DAYS/KG)	.20E-01
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL FOR PASTURE AND FORAGE (IN PCI/KG DRY WEIGHT PER PCI/KG DRY SOIL)	.80E-01
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL BY EDIBLE PARTS OF CROPS (IN PCI/KG WET WEIGHT PER PCI/KG DRY SOIL)	.13E-01
0	GI UPTAKE FRACTION (INHALATION)	.95E+00
0	GI UPTAKE FRACTION (INGESTION)	.95E+00
0	PARTICLE SIZE (MICRONS)	.10E+01
0	SOLUBILITY CLASS	D
1	DATE Thu Aug 1 10:38:16 2002	
0	*LIST OF INPUT DATA FOR NUCLIDE BA-137M *	
0	RADIOACTIVE DECAY CONSTANT (PER DAY)	.63E-04
0	ENVIRONMENTAL DECAY CONSTANT--SURFACE (PER DAY)	.55E-04
0	ENVIRONMENTAL DECAY CONSTANT--WATER (PER DAY)	.00E+00

0	AVERAGE FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH L OF MILK (DAYS/L)	.35E-03
0	FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH KG OF FLESH (DAYS/KG)	.15E-03
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL FOR PASTURE AND FORAGE (IN PCI/KG DRY WEIGHT PER PCI/KG DRY SOIL)	.15E+00
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL BY EDIBLE PARTS OF CROPS (IN PCI/KG WET WEIGHT PER PCI/KG DRY SOIL)	.64E-02
0	GI UPTAKE FRACTION (INHALATION)	.10E+00
0	GI UPTAKE FRACTION (INGESTION)	.10E+00
0	PARTICLE SIZE (MICRONS)	.10E+01
0	SOLUBILITY CLASS	D
0		
1	DATE Thu Aug 1 10:38:16 2002	
0	*LIST OF INPUT DATA FOR NUCLIDE U-234 *	
0	RADIOACTIVE DECAY CONSTANT (PER DAY)	.78E-08
0	ENVIRONMENTAL DECAY CONSTANT--SURFACE (PER DAY)	.55E-04
0	ENVIRONMENTAL DECAY CONSTANT--WATER (PER DAY)	.00E+00
0	AVERAGE FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH L OF MILK (DAYS/L)	.60E-03
0	FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH KG OF FLESH (DAYS/KG)	.20E-03
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL FOR PASTURE AND FORAGE (IN PCI/KG DRY WEIGHT PER PCI/KG DRY SOIL)	.85E-02
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL BY EDIBLE PARTS OF CROPS (IN PCI/KG WET WEIGHT PER PCI/KG DRY SOIL)	.17E-02
0	GI UPTAKE FRACTION (INHALATION)	.20E-02
0	GI UPTAKE FRACTION (INGESTION)	.20E+00
0	PARTICLE SIZE (MICRONS)	.10E+01
0	SOLUBILITY CLASS	Y
0		
1	DATE Thu Aug 1 10:38:16 2002	
0	*LIST OF INPUT DATA FOR NUCLIDE U-235 *	
0	RADIOACTIVE DECAY CONSTANT (PER DAY)	.27E-11
0	ENVIRONMENTAL DECAY CONSTANT--SURFACE (PER DAY)	.55E-04
0	ENVIRONMENTAL DECAY CONSTANT--WATER (PER DAY)	.00E+00
0	AVERAGE FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH L OF MILK (DAYS/L)	.60E-03
0	FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH KG OF FLESH (DAYS/KG)	.20E-03
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL FOR PASTURE AND FORAGE (IN PCI/KG DRY WEIGHT PER PCI/KG DRY SOIL)	.85E-02
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL BY EDIBLE PARTS OF CROPS (IN PCI/KG WET WEIGHT PER PCI/KG DRY SOIL)	.17E-02
0	GI UPTAKE FRACTION (INHALATION)	.20E-02
0	GI UPTAKE FRACTION (INGESTION)	.20E+00
0	PARTICLE SIZE (MICRONS)	.10E+01
0	SOLUBILITY CLASS	Y
0		
1	DATE Thu Aug 1 10:38:16 2002	
0	*LIST OF INPUT DATA FOR NUCLIDE U-238 *	
0	RADIOACTIVE DECAY CONSTANT (PER DAY)	.42E-12
0	ENVIRONMENTAL DECAY CONSTANT--SURFACE (PER DAY)	.55E-04
0	ENVIRONMENTAL DECAY CONSTANT--WATER (PER DAY)	.00E+00
0	AVERAGE FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH L OF MILK (DAYS/L)	.60E-03
0	FRACTION OF ANIMAL'S DAILY INTAKE OF NUCLIDE WHICH APPEARS IN EACH KG OF FLESH (DAYS/KG)	.20E-03
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL FOR PASTURE AND FORAGE (IN PCI/KG DRY WEIGHT PER PCI/KG DRY SOIL)	.85E-02
0	CONCENTRATION FACTOR FOR UPTAKE OF NUCLIDE FROM SOIL BY EDIBLE PARTS OF CROPS (IN PCI/KG WET WEIGHT PER PCI/KG DRY SOIL)	.17E-02
0	GI UPTAKE FRACTION (INHALATION)	.20E-02

0 GI UPTAKE FRACTION (INGESTION) .20E+00  
 0 PARTICLE SIZE (MICRONS) .10E+01  
 0 SOLUBILITY CLASS Y  
 0  
 1 DATE Thu Aug 1 10:38:16 2002  
 0 EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222  
 AT VARIOUS LOCATIONS IN THE ENVIRONMENT  
 0  
 AREA EXPOSURE LEVEL(.7 EQF) ADJUSTED  
 (PERSON .WL) EQUIL. FRACT. ADJUSTED  
 LEVELS  
 WIND DISTANCE  
 TOWARD (METERS)  
 0 SSW 9600 .0E+00 .00 .0E+00  
 1 DATE Thu Aug 1 10:38:16 2002  
 0 EXPOSURE LEVEL FOR SHORT-LIFE PROGENY OR RN-222 AT LOCATION OF MAXIMUM  
 INDIVIDUAL DOSE FROM ALL PATHWAYS FOR EACH ORGAN  
 0ORGAN LOCATION OF EXPOSURE LEVEL(.7 EQF) ADJUSTED  
 MAXIMUM DOSE EQUIL. FRACT. ADJUSTED  
 LEVELS  
 EFFEC 8 1 .0E+00 .0E+00 .0E+00  
 GONADS 8 1 .0E+00 .0E+00 .0E+00  
 BREAST 8 1 .0E+00 .0E+00 .0E+00  
 R MARROW 8 1 .0E+00 .0E+00 .0E+00  
 LUNG 8 1 .0E+00 .0E+00 .0E+00  
 THYROID 8 1 .0E+00 .0E+00 .0E+00  
 BON SURF 8 1 .0E+00 .0E+00 .0E+00  
 RMNDR 8 1 .0E+00 .0E+00 .0E+00  
 INT WALL 8 1 .0E+00 .0E+00 .0E+00  
 LIVER 8 1 .0E+00 .0E+00 .0E+00  
 KIDNEYS 8 1 .0E+00 .0E+00 .0E+00  
 OIHEAD= 1  
 ICRP= 1

00 INDICATES THE TABLE WILL NOT BE PRINTED  
 1 INDICATES INDIVIDUAL VALUES WILL BE PRINTED  
 2 INDICATES MEAN INDIVIDUAL VALUES WILL BE PRINTED  
 3 INDICATES COLLECTIVE VALUES WILL BE PRINTED  
 4 INDICATES ALL OF THE ABOVE WILL BE PRINTED

QUANTITY TABLE NO. 1 2 3 4 5 6 7  
 +  
 1.DOSE RATES 1 0 1 1 0 0 0  
 2.HEALTH RISKS 0 0 0 0 0 0 0  
 3.RISK EQUIVALENT FACTOR 0 0 0 0 0 0 0  
 TABLES FOR THE SELECTED INDIVIDUAL WILL BE DONE FOR THE LOCATION HAVING 100.00 % OF THE HIGHEST  
 TOTAL RISK.

DOSE RATE TABLES COMBINING LOW AND HIGH LET WILL BE PRINTED.  
 HEALTH RISK TABLES COMBINING LOW AND HIGH LET WILL BE PRINTED.  
 OTHER GROUND SURFACE CORRECTION FACTOR IS .50

OTHER ARE 8 ORGANS TO BE OUTPUT. THEY ARE:

ORGAN	TIME	ORGAN	TIME	ORGAN	TIME
GONADS	50.	BREAST	50.	R MAR	50.
LUNGS	50.	THYROID	50.	ENDOST	50.
RMNDR	50.	EFFEC	50.		
0 ORGAN	DOSE EQUIVALENT FACTORS				
	LOW LET		HIGH LET		
GONADS	1.00000		20.0000		
BREAST	1.00000		20.0000		
R MAR	1.00000		20.0000		
LUNGS	1.00000		20.0000		
THYROID	1.00000		20.0000		
ENDOST	1.00000		20.0000		
RMNDR	1.00000		20.0000		
EFFEC	1.00000		20.0000		

0THERE ARE 11 CANCERS TO BE OUTPUT.

A 1 INDICATES ABSOLUTE RISK; A 2 IS RELATIVE RISK.

	CANCER	CANCER	CANCER	CANCER			
LEUKEMIA	1. BONE	1. THYROID	1. BREAST	1.			
LUNG	1. STOMACH	1. BOWEL	1. LIVER	1.			
PANCREAS	1. URINARY	1. OTHER	1.				
SR-90	1.00E+00	D	3.00E-01	3.00E-01	.00E+00	.00E+00	0
Y-90	1.00E+00	Y	1.00E-04	1.00E-04	.00E+00	.00E+00	0
CS-137	1.00E+00	D	9.50E-01	9.50E-01	.00E+00	.00E+00	0
BA-137M	1.00E+00	D	1.00E-01	1.00E-01	.00E+00	.00E+00	0
U-234	1.00E+00	Y	2.00E-03	2.00E-01	.00E+00	.00E+00	0
U-235	1.00E+00	Y	2.00E-03	2.00E-01	.00E+00	.00E+00	0
U-238	1.00E+00	Y	2.00E-03	2.00E-01	.00E+00	.00E+00	0

0M	NUCAIR	RESPN	PSIZN	GIABS(1)-GIABS(4)	INDICATORS:	2	3	4	5	12	13	14	15	33
96	97	98	99											

1	SR-90	D	1.00E+00	.00E+00	3.00E-01	.00E+00	.00E+00	2	2	1	1	2	2	1	1	0
1	1	2	2													
2	Y-90	Y	1.00E+00	.00E+00	1.00E-04	.00E+00	.00E+00	1	2	1	1	1	2	1	1	0
1	1	2	1													
3	CS-137	D	1.00E+00	.00E+00	9.50E-01	.00E+00	.00E+00	1	1	1	1	1	1	1	1	0
1	1	1	1													
4	BA-137M	D	1.00E+00	.00E+00	1.00E-01	.00E+00	.00E+00	1	1	1	1	1	1	1	1	0
1	1	1	1													
5	U-234	Y	1.00E+00	.00E+00	2.00E-01	.00E+00	.00E+00	3	15	1	1	3	15	1	1	0
1	1	15	3													
6	U-235	Y	1.00E+00	.00E+00	2.00E-01	.00E+00	.00E+00	3	5	1	1	3	5	1	1	0
1	1	5	3													
7	U-238	Y	1.00E+00	.00E+00	2.00E-01	.00E+00	.00E+00	3	15	1	1	3	15	1	1	0
1	1	15	3													

0THERE ARE 7 RADIONUCLIDES TO BE OUTPUT.

NUCLIDE	PARTICLE SIZE	CLEARANCE CLASS	STOMACH	G.I. ABSORPTION FRACTION	ULI	LLI
SR-90	1.00000	D	.00000	.30000	.00000	
.00000						
Y-90	1.00000	Y	.00000	.00010	.00000	
.00000						
CS-137	1.00000	D	.00000	.95000	.00000	
.00000						
BA-137M	1.00000	D	.00000	.10000	.00000	
.00000						
U-234	1.00000	Y	.00000	.20000	.00000	
.00000						
U-235	1.00000	Y	.00000	.20000	.00000	
.00000						
U-238	1.00000	Y	.00000	.20000	.00000	
.00000						

1 DATE Thu Aug 1 10:38:16 2002

THE LOCATION USED FOR THE SELECTED INDIVIDUAL EXPOSURE IS

==> 9600 METERS SSW FROM THE SOURCE.

THE LIFETIME FATAL CANCER RISK IS 1.19E-04.

0ORGAN DOSE WEIGHTING FACTORS

ORGAN	FACTORS	PATHWAYS
GONADS	.25000	1 2 3 4
BREAST	.15000	1 2 3 4
R MAR	.12000	1 2 3 4
LUNGS	.12000	1 2 3 4
THYROID	.03000	1 2 3 4
ENDOST	.03000	1 2 3 4
RMNDR	.30000	1 2 3 4

1 DATE Thu Aug 1 10:38:16 2002

0

#### ORGAN DOSE/EXPOSURE SUMMARY

0\*\*\* SELECTED INDIVIDUAL \*\*\*

0DOSE RATES:

EFFEC	WT. SUM	ORGANS:	GONADS	BREAST	R MAR	LUNGS	THYROID	ENDOST	RMNDR
-------	---------	---------	--------	--------	-------	-------	---------	--------	-------

DOSE EQUIVALENT (MREM/Y) 2.82E-01 2.84E-01 1.39E+00 6.76E+01 2.76E-01 1.14E+01 1.09E+00  
9.07E+00 9.07E+00

1 DATE Thu Aug 1 10:38:16 2002

0

PATHWAY DOSE/EXPOSURE SUMMARY

0\*\*\* SELECTED INDIVIDUAL \*\*\*

ODOSE RATES:

WEIGHTED SUMS OF ORGAN DOSE RATES

PATHWAYS:	INGESTION	INHALATION	AIR	GROUND	INTERNAL	EXTERNAL	TOTAL
			IMMERSION	SURFACE			

DOSE EQUIVALENT (MREM/Y) 7.75E-01 8.11E+00 1.03E-05 1.87E-01 8.88E+00 1.87E-01 9.07E+00

1 DATE Thu Aug 1 10:38:16 2002

0

NUCLIDE DOSE/EXPOSURE SUMMARY

0\*\*\* SELECTED INDIVIDUAL \*\*\*

ODOSE RATES:

WEIGHTED SUMS OF ORGAN DOSE RATES

NUCLIDES:	SR-90	Y-90	CS-137	BA-137M	U-234	U-235	U-238
-----------	-------	------	--------	---------	-------	-------	-------

TOTAL

DOSE EQUIVALENT (MREM/Y) 1.01E-01 2.35E-03 3.60E-02 1.23E-01 3.10E+00 2.94E+00 2.76E+00  
9.07E+00

1 DATE Thu Aug 1 10:38:16 2002

0

RISK/RISK EQUIVALENT SUMMARY

0\*\*\* SELECTED INDIVIDUAL \*\*\*

OLIFETIME FATAL CANCER RISK:

LIVER	PANCREAS	CANCERS: LEUKEMIA	BONE	THYROID	BREAST	LUNG	STOMACH	BOWEL		
		PANCREAS	URINARY	OTHER	TOTAL					
TOTAL				2.79E-06	7.44E-07	1.19E-07	1.05E-06	1.09E-04	6.19E-07	4.04E-07
7.00E-07	4.30E-07	4.30E-07	2.14E-06			5.26E-07	1.19E-04			

0AVERAGE LIFE LOSS PER PREMATURE DEATH:

LIVER	PANCREAS	CANCERS: LEUKEMIA	BONE	THYROID	BREAST	LUNG	STOMACH	BOWEL		
		PANCREAS	URINARY	OTHER	TOTAL					
COMBINED (YR)				2.89E+01	2.50E+01	2.82E+01	2.14E+01	2.25E+01	2.14E+01	2.14E+01
2.14E+01	2.14E+01	2.14E+01	2.09E+01			2.14E+01	2.26E+01			

1 DATE Thu Aug 1 10:38:16 2002

0

PATHWAY RISK/RISK EQUIVALENT SUMMARY

0\*\*\* SELECTED INDIVIDUAL \*\*\*

OLIFETIME FATAL CANCER RISK:

PATHWAYS:	INGESTION	INHALATION	AIR	GROUND	INTERNAL	EXTERNAL	TOTAL			
			IMMERSION	SURFACE						
TOTAL				5.93E-06	1.09E-04	2.45E-10	4.44E-06	1.14E-04	4.44E-06	1.19E-04
1	DATE	Thu Aug 1	10:38:16	2002						
0										

NUCLIDE RISK/RISK EQUIVALENT SUMMARY

0\*\*\* SELECTED INDIVIDUAL \*\*\*

OLIFETIME FATAL CANCER RISK:

NUCLIDES:	SR-90	Y-90	CS-137	BA-137M	U-234	U-235	U-238
TOTAL							
TOTAL		1.71E-06	3.19E-08	9.41E-07	2.94E-06	3.95E-05	3.82E-05
1.19E-04							

INEL MAXIMUM INDIVIDUAL DARTAB OUTPUT TABLES  
INDIVIDUAL DOSE EQ. RATE (MRREM/YEAR)

0\*\*\*FOR ORGAN :EFFEC

NUCLIDES PATHWAYS	SR-90	Y-90	CS-137	BA-137M	U-234	U-235	U-238	TOTAL
INGESTION	9.65E-02	2.14E-03	3.53E-02	5.63E-07	2.25E-01	2.14E-01	2.02E-01	7.75E-01
% OF INTERNAL	9.52E+01	9.13E+01	9.81E+01	9.58E+01	7.24E+00	7.45E+00	7.32E+00	8.73E+00
% OF ALL PATHWAYS	9.52E+01	9.13E+01	9.81E+01	4.58E-04	7.24E+00	7.29E+00	7.32E+00	8.55E+00
INHALATION	4.84E-03	2.05E-04	6.75E-04	2.45E-08	2.88E+00	2.67E+00	2.56E+00	8.11E+00
% OF INTERNAL	4.78E+00	8.74E+00	1.88E+00	4.17E+00	9.28E+01	9.26E+01	9.27E+01	9.13E+01
% OF ALL PATHWAYS	4.78E+00	8.74E+00	1.88E+00	2.00E-05	9.28E+01	9.05E+01	9.27E+01	8.94E+01
AIR IMMERSION	.00E+00	.00E+00	.00E+00	8.24E-06	2.02E-09	2.04E-06	1.37E-09	1.03E-05
% OF EXTERNAL	.00E+00	.00E+00	.00E+00	6.72E-03	6.63E-04	3.19E-03	5.62E-04	5.50E-03
% OF ALL PATHWAYS	.00E+00	.00E+00	.00E+00	6.72E-03	6.52E-08	6.92E-05	4.97E-08	1.13E-04
GROUND SURFACE	.00E+00	.00E+00	.00E+00	1.23E-01	3.05E-04	6.38E-02	2.44E-04	1.87E-01
% OF EXTERNAL	.00E+00	.00E+00	.00E+00	1.00E+02	1.00E+02	1.00E+02	1.00E+02	1.00E+02
% OF ALL PATHWAYS	.00E+00	.00E+00	.00E+00	1.00E+02	9.83E-03	2.17E+00	8.85E-03	2.06E+00
INTERNAL	1.01E-01	2.35E-03	3.60E-02	5.87E-07	3.10E+00	2.88E+00	2.76E+00	8.89E+00
% OF ALL PATHWAYS	1.00E+02	1.00E+02	1.00E+02	4.78E-04	1.00E+02	9.78E+01	1.00E+02	9.79E+01
EXTERNAL	.00E+00	.00E+00	.00E+00	1.23E-01	3.05E-04	6.38E-02	2.44E-04	1.87E-01
% OF ALL PATHWAYS	.00E+00	.00E+00	.00E+00	1.00E+02	9.83E-03	2.17E+00	8.85E-03	2.06E+00
TOTAL OVER ALL PATHWAYS	1.01E-01	2.35E-03	3.60E-02	1.23E-01	3.10E+00	2.94E+00	2.76E+00	9.07E+00

```

1PREPAR NAMELIST INPUT FILE

C-SHELL SCRIPT ===> HP.CSH RUNS THE CAP88 SYSTEM
ALLRAD FILE ===> ALLRAD88 CONTAINS THE DCFs
POP FILE ===> CONTAINS THE POPULATION GRID (POP RUNS ONLY)
STARFILE ===> INEEL MESONET DATA
RADRISK FILE ===> EPA
*
IDAHO NATIONAL ENGINEERING & ENVIRONMENTAL LABORATORY
BECHTEL BWXT LLC APPLIED GEOSCIENCES DEPARTMENT
IDAHO FALLS
ID
83415-2107
CFA UNIT Ci GROUND RELEASES
2002
OPTION
&OPTI OPTION=0,1,0,1,0,0,0,1,0,LIST=1,LIPO=0,
NUTB=0,NSTB=0,NNTB=0,NTTB=1,NRTB=0,TSUBB=100. &END
GRID
&GRID NOL=8,NOU=8,NRL=1,NRU=1,IDIST=9600 &END
METEOROLOGICAL DATA
&METE LID=800.0,RR=20.8,TA=279.,TG=7.28E-2,1.09E-1,1.455E-1,
Z=10.,Z0=0.01,J0=0.001,DF=0.0 &END
PHYSICAL STACK DATA
1
&PHYS PH=0.0, VEL=0.0, DIA=0.0 &END
WIND FREQUENCY DATA
STAR
DEFAULT
RADIONUCLIDE DATA
7
&RADI NUC='SR-90',REL=1.0E-00 &END
&RADI NUC='Y-90',REL=1.0E-00,IAN=-1 &END
&RADI NUC='CS-137',REL=1.0E-00 &END
&RADI NUC='BA-137M',REL=1.0E-00,IAN=-1 &END
&RADI NUC='U-234',REL=1.0E-00 &END
&RADI NUC='U-235',REL=1.0E-00 &END
&RADI NUC='U-238',REL=1.0E-00 &END
MODIFICATIONS OF NUCLIDE DATA
2
&MODI NUC='Y-90',LAMRR=6.64E-05 &END
&MODI NUC='BA-137M',LAMRR=6.29E-05 &END
AG DATA
&AGDT FV=0.7,0.3,0.0,FB=0.442,0.558,0.0,FM=0.399,0.601,0.0 &END
COMMENTS
UNIT CI RELEASES FOR CFA-04 EXCAVATION PROJECT
RECEPTOR AT MAXIMUM INEEL BOUNDARY LOCATION

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